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Three Essays on Labor Market Analysis:
Dissertation Summary

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This dissertation examines the influence of exogenous price changes on equilibrium behavior in three distinct settings. The first essay investigates the dynamic impact of oil price shocks on the employment and wages of production workers in the U.S. Oil and Gas Field Services (OGFS) industry. The second essay, with Matias Busso, evaluates Round I of the federal urban Empowerment Zone (EZ) program. The third essay examines the impact of juvenile curfew laws on adolescent criminal behavior.

All three papers deal with the mechanisms by which inherently local markets adjust to exogenous changes in the economic environment. The findings of each strand of research have policy implications that extend beyond the particular market studied.

Understanding Sectoral Labor Market Dynamics

The essay on dynamic equilibrium in the oil industry empirically examines the sectoral reallocation process by means of a case study. The oil industry is an interesting case to study for a number of reasons. First, given the debate over the potential macroeconomic effects of oil, it is of interest to see whether the price of oil has important allocative effects on the industry to which it is most directly tied (see, for example, Barsky and Kilian [2002, 2004] and Hamilton [1983, 1988, 2003]). Second, the OGFS is a nonunionized, high-turnover industry requiring little formal training for production workers. In this sense, it approximates a neoclassical spot market for labor. To the extent that important adjustment rigidities are found in this market, they are likely to represent a lower bound on the sort of rigidities found in more specialized labor markets with important training requirements and durable employment relationships. Finally, the immense changes in the price of crude petroleum over the time period in question provide ample exogenous variation in labor demand with which to examine the performance of standard models of adjustment. Indeed, over the first 10 years of the study, employment in the oil industry almost quadrupled as a result of the oil crises of the 1970s.

Using a simple econometric specification, it is found that labor quickly reallocates across sectors in response to price shocks, but that substantial wage premia are necessary to induce such reallocation. Surprisingly, these wage premia emerge quite slowly, peaking only as labor adjustment ends and then slowly dissipating. This is puzzling for conventional market clearing models, most of which would require wages

to jump on impact in order to attract such large initial inflows of workers and slowly fall as the wage premia are arbitrated away.

Thus, the fundamental question becomes, what signals serve to marshal resources to the sectors in which they are needed most? The answer provided is that features of the labor market other than the contemporaneous wage can, in equilibrium, serve as credible signals for use by agents in making sectoral migration decisions. To formalize this idea, a dynamic market clearing model with forward-looking agents and industrywide adjustment rigidities is proposed. The parameters of the model are structurally estimated and used to simulate responses to hypothetical oil price shocks. The exercise demonstrates that a neoclassical labor market with reasonable technological parameters and preferences can yield equilibrium wage and employment dynamics that look quite similar to what is observed empirically for the oil industry over this time period.

The core insight of the model is relatively straightforward. Forward-looking agents with rational expectations will make decisions based not just upon the current wage, but upon other variables such as oil prices which are, in equilibrium, capable of predicting future wages. This implies that the intersectoral elasticity of labor supply hinges crucially upon expectations. Workers will be less eager to switch into a sector that is experiencing a transitory increase in labor demand than a sector in which demand is expected to be persistently higher, for in the latter case, wage premia are expected to last much longer, and the chance of needing to leave the sector in the future is lower.

In the data, oil shocks appear to be heavily persistent. So when the price of oil rises it signals that the value of being employed in the oil industry has risen substantially. This means that, *ceteris paribus*, the reservation wages of workers considering switching into the industry actually fall on impact because workers expect good things from oil employment in the future. Thus, equilibria can emerge where the compensation of workers for their sectoral switching costs is deferred. Such equilibria are easily found in environments where sectoral labor demand responds sluggishly, for in such cases the rightward shift of the labor supply curve on news of an oil price increase is initially cancelled out by a rightward shift of the industrywide labor demand schedule, yielding stagnant wages alongside large employment increases. But as the adjustment process continues, demand eventually outstrips supply and wages rise, thereby confirming the original beliefs justifying the initial shift in the labor supply schedule. Eventually these wage premia die out as the sector grows toward a new steady state size.

The equilibrium model developed in this essay is important for economists seeking to understand the reallocation process. First, in such a model, standard instruments for labor demand do not identify stable labor supply parameters. The impact of a labor demand shifter such as the price of

oil on employment will, in equilibrium, depend upon the technological features of production in the industry governing how quickly the demand for labor can adjust to changes in the productivity of the workforce. Second, the exercise demonstrates that the sluggish response of factor prices to productivity shocks need not signal wage rigidity. Rather, such behavior is compatible with market clearing models with reasonable parameter values. This is important not only because economists seek to better understand the mechanisms governing the reallocation process, but because market clearing models generally imply more efficient behavior than sticky wage models. Finally, the paper constitutes a methodological advance in the study of dynamic equilibrium models of sectoral choice. The dynamic discrete choice problem of individual workers is coupled with the dynamic labor demand problem of firms and solved in a rational expectations environment under uncertainty. Thus, the equilibrium stochastic process characterizing wages and employment emerges out of the solution technique. Previous work on this subject has only considered serious dynamics on one side of the labor market or has relied upon solving social planning problems without specifying how the solutions to such problems are decentralized. The methods developed here are quite easily generalizable to other environments, including models of interregional migration and local labor markets.

Empowerment Zones

Local economic development programs are an important yet understudied feature of the U.S. tax and expenditure system. Bartik (2002) estimates that state and local governments spend \$20–\$30 billion per year on economic development programs, with an additional \$6 billion per annum coming from the federal government. However, little academic work has been done evaluating the impact of these efforts on local communities, largely because of the small scale and general diversity of most such programs (see Bartik [1991] and Nolan and Wong [2004] for a review). This essay (which is joint work with Matias Busso) evaluates the federal urban Empowerment Zone (EZ) program, which constitutes one of the largest standardized federal interventions in impoverished urban American neighborhoods since President Johnson's Model Cities program.

With a mandate to revitalize distressed urban communities, the EZ program represents a nexus between social welfare policy and economic development efforts. Unlike conventional antipoverty programs, Empowerment Zones aim to help the poor by subsidizing demand for their services at local firms, which has made them one of the few social welfare programs popular with conservatives. In an era where nonentitlement spending on social welfare programs has been scaled back dramatically, the federal Empowerment Zone program has enjoyed rapid growth. After the initial funding of eight first-round EZs in 1994, 15 more cities were

awarded zones in 1999, followed by another 9 in 2001. An additional 49 urban areas were concurrently granted smaller Enterprise Communities (ECs), which entailed a reduced package of benefits. The enthusiasm for spatially targeted tax credits has led to the birth of a variety of new zones, each modifying the original EZ concept in different ways.¹

Most recently, the justification for tax abatement zones has been expanded to include disaster relief. For example, in the wake of the September 11th attacks, parts of New York city were designated "Liberty Zones" and granted a variety of localized tax credits. Then, in 2006, Congress passed legislation authorizing a set of "Gulf Opportunity Zones" for areas stricken by Hurricane Katrina.

These recent forays of the IRS into the business of local economic development should merit the attention of economists. The U.S. General Accounting Office (1999) estimates that the first round Empowerment Zones will cost \$2.5 billion over the course of the 10-year program. Given that EZ neighborhoods have a total population of under a million people, subsidies of this magnitude, when directed to such relatively small urban areas, might be expected to have important effects upon the behavior of firms and workers.

This essay uses four decades of census data on local neighborhoods in conjunction with proprietary EZ application data obtained from HUD to assess the impact of Round I EZ designation on 12 local labor and housing market outcomes over the period 1994–2000.² Utilizing a semiparametric difference-in-differences estimator suggested by Abadie (2005), we find that neighborhoods receiving EZ designation experienced moderate improvements in labor market conditions and large increases in owner-occupied housing values and rents relative to rejected and future Empowerment Zones. These effects were accompanied by small changes in the demographic composition of the neighborhoods, suggesting that some, though not all, of the observed improvements in EZ neighborhoods are the result of neighborhood churning. No evidence exists of large-scale gentrification, indicating that many of the benefits (and costs) of the program have been captured by preexisting residents. We assess the robustness of our results by conducting a series of false experiments involving the application of the estimator to the decade before the EZs were awarded. We find that our preferred estimator is remarkably robust, failing to reject a single false experiment, while alternative estimators that involve making comparisons within cities are unreliable.

The implications of these findings for the study of local economic development policies are manifold. First, it appears that the combination of tax credits and grants can be moderately effective at stimulating local labor demand in areas with very low labor force participation rates. Second, in the case of the EZs, the impact of these demand subsidies does not seem to have been captured by the relatively well off; economic development and poverty reduction seem to have accompanied one another in the manner originally

hoped for by proponents of the program. Third, while the treated communities appear to have avoided large-scale gentrification over the period examined in this study, policymakers should consider carefully the potential impact of demand-side interventions on the local cost of living. Given that the vast majority of EZ residents rent their homes, small changes in the cost of zone living can be expected to impose large burdens on the roughly two-thirds of the EZ population who do not work. Trade-offs of this sort should be taken into account when attempting to determine the incidence of the EZ subsidies. If authorities wish to use EZs as antipoverty programs, they may wish to consider combining housing assistance or incentives for the development of mixed income housing as complements to the tax-based demand-side subsidies.

As in the first essay, a key question for understanding the effects of the program is understanding the signals around which firms and workers are coordinating. The experience of the Round I EZs suggests that government entities may be able to play an important role in coordinating expectations among a wide group of nonprofit, public, and private entities interested in investing in disadvantaged neighborhoods. The role of public seed money in leveraging outside investments in local economic development has been understudied.³ Relatively small grants, in conjunction with substantial political support at the federal level, seem to have been successful in leveraging substantial outside investments in Round I EZ neighborhoods. More research is necessary to understand the conditions under which such schemes are likely to be effective.

The Impact of Juvenile Curfew Laws

In the early 1990s youth curfews became a popular strategy for combating juvenile delinquency. A survey by Ruefle and Reynolds (1996) found that 146 of the 200 American cities with populations above 100,000 had curfew laws on the books, with 110 having enacted or revised curfew laws between 1990 and 1995. A subsequent study by the U.S. Conference of Mayors (1997) found that 80 percent of the 347 cities with populations over 30,000 had youth curfew ordinances.

Despite their popularity with local governments, little is known about the effects of curfew laws on youth outcomes. While some research attempts to estimate the effect of curfews on violent crimes committed by and perpetrated against youths, the findings usually rely on tenuous identifying assumptions (see Adams [2003] for a review of the literature). Furthermore, existing studies have ignored one of the central questions involving curfews, which is whether they have spillover effects on other age groups.

This essay evaluates the effectiveness of curfew ordinances by comparing the arrest behavior of various age groups within a city before and after curfew enactment. Since cur-

few ordinances only apply to youth of or below a given age, usually 16 or 17, young people just above a city's statutory maximum curfew age provide a natural control group. However, there are reasons to believe that curfew laws may affect these exempt age-groups as well. By comparing outcomes for age-groups several years older than the statutory maximum age to those just above the maximum age, it is possible to test for the presence of any such spillover effects.

Analyzing both sets of comparisons is important because curfew policies can be thought of as constituting two treatments, each applying to a different set of age groups. The first treatment, the statutory treatment, is that of being subject to a curfew citation, fine, temporary detention, or whatever punishment is statutorily prescribed for curfew violations by minors. This treatment only affects those youth under the statutory curfew age. The second treatment, the statistical discrimination treatment, is that of being subject to lower standards of probable cause because of one's perceived youth. Police are unlikely to be able to distinguish between young people just above and below the curfew age. Thus, for adjacent age groups curfews should raise the probability of being stopped or searched by an amount that depends very little on one's actual age. The possibility of this second effect is frequently cited by the American Civil Liberties Union as an argument for reversing such ordinances on the grounds that they constitute violations of fundamental civil liberties.

Constitutional issues aside, both treatments should be of interest to economists. The statutory treatment represents the deterrent effect of the curfew's statutory sanctions. Identifying this effect tells us how much crime could be reduced by raising penalties or increasing enforcement of curfew ordinances. As such, the paper falls into the well-developed economics literature on optimal fines (see Becker [1968], Polinsky and Shavell [1984], and Stigler [1970] for theory, and Bar-Ilan and Sacerdote [2004] for an example of recent empirical work). It also implicitly provides an estimate of an important margin in the economics of crime, the substitutability of criminal activity across time.⁴ Indeed, if, as in basic economic models (Becker 1968), crime is a purposive activity, then curfews should only deter delinquency if the technology used to produce this behavior is imperfectly substitutable between curfew and noncurfew hours.⁵ Borrowing from the optimal taxation literature, if the degree of substitutability is very low, then taxing nocturnal youth activity may be a viable second-best solution to the problem of delinquency.

The statistical discrimination treatment tells us the impact of weakening Fourth Amendment protections against unreasonable search and seizure. It is well understood by economists and legal theorists that rights impose costs and benefits, the distribution of which may not lead to efficiency. Estimates of this margin are important not only for those interested in evaluating the costs and benefits of the age discrimination implicit in youth curfews, but those involved in

the recent debate over racial profiling and national security. Furthermore, these estimates are closely tied to the elasticity of criminal behavior with respect to the probability of detection, a key parameter in Becker's classic model.

Under the assumption that police cannot distinguish between adjacent ages ex-ante, comparisons of the response of age groups just below the curfew age to those just above will estimate the statutory treatment effect. Similarly, statistical discrimination effects can be estimated by comparing the response of age-groups just above the curfew age to those several years older.

To summarize the results, the empirical analysis yields strong evidence of persistent statutory treatment effects on criminal behavior. Arrests for violent crime and property crime both appear to fall by around 10 percent in the year after curfew enactment, with the effects on violent crime intensifying substantially in subsequent years. No evidence is found of important spillover effects on either measure of arrests.

It is interesting to note that these findings are in keeping with the perceptions of those subject to curfew policies. As Adams (2003) notes, "Public opinion shows overwhelming support for curfews . . . the primary basis for [this] support is the conviction that curfews reduce crime and make the streets safer." Though this analysis cannot uncover the exact mechanism through which curfews affect crime, the large statutory results suggest youth crime is imperfectly substitutable across time and that temporal targeting of law enforcement policies may be effective.

The lack of noticeable spillover effects has multiple interpretations. One is that police do not statistically discriminate against youth slightly above curfew age; another is that this discrimination occurs but is ineffective at reducing crime. A third interpretation is that statistical discrimination occurs and is effective, but its effects are masked by negative dependence across age-groups. The first two stories would suggest that the statutory estimates are truly picking up the deterrent effect of fines. Since the penalties associated with curfew violation are generally small, this claim seems dubious. The third story relies upon a model of crime as a congestible economic activity, a hypothesis which enjoys little empirical or theoretical support.

An alternative rationalization of the evidence is that parents play an important role in the enforcement of curfews over and above that of police. If municipal curfews act as focal points in the establishment of household policies, a curfew with modest fines (and arrests) could lead to large changes in the behavior of youth. The potential role of parents in self-enforcement of curfews is an important area for future research.

The more general policy implications of these findings for criminal justice policy are nuanced. Though curfews appear to be effective at reducing the incidence of crimes committed by juveniles, we have little data on the costs of such pro-

grams, either directly in terms of dollars spent enforcing such ordinances, or indirectly in terms of the opportunity costs of policing. Ultimately, the desirability of curfew ordinances will be context specific. In cities where a large fraction of youth crime occurs at night and the cost of additional nighttime policing is low, curfews may be an effective law enforcement tool.

Notes

1. In addition to urban EZs and ECs, there are a series of rural EZs and ECs, Enhanced Enterprise Communities (EECs), and 28 urban and 12 rural "Renewal Communities" entitled to benefits similar in magnitude to EZs.
2. The outcomes are poverty, employment, unemployment, owner-occupied housing values, rents, family earnings, percent of workers traveling less than 20 minutes to work, population, the fraction of houses that are vacant, the fraction of the neighborhood that is black, the fraction of residents who live in the same house as five years ago, and the fraction of residents who hold a college degree.
3. Andreoni (1998) has modeled the role of seed money in determining charitable contributions. To the author's knowledge, the role of seed money in spurring economic development has not been explored in the academic literature.
4. See Jacob, Lefgren, and Moretti (2004) for an examination of the substitutability of criminal activity across days as opposed to within a day.
5. Note that even if youth crime is largely spontaneous and unplanned, one might still find that curfews have an effect by reducing the preconditions (underage drinking, loitering at night) that support such impulsive behavior.

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